

Mars Construction, LLC

Title: Water Well Design (Phase I in progress)

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Design Variables need to be defined:

Water Well Drilling on Mars is a lot more complicated than that on Earth. Drilling on Mars will require developing technologies to drill through ice and the pump at the bottom of well will have to melt the ice before pumping it up to surface. This technology has not been developed on Earth. This design definition document will define the requirements to drill and pump water to a storage facility on the Mars surface. Since the atmosphere is freezing all process piping will have to be heated traced. Pumps and other equipment will have to be in heated maintenance facility that also shelters the equipment from the Mars dust. The equipment will have to operate in lower temperatures than that of Earth.

Questions:

1. Is there an electric air compressor that will work with carbon dioxide?
2. Bore depth?
3. Bore size?
4. Motor Diameter?
5. Can bore drill do a bell or spherical compartment at bottom of well?

You Tube on Ice on Mars:

1. [Evidence of Liquid Lake beneath Mars' surface](#) water has been detected in an underground lake on Mars, found 1 kilometer underground using ground penetrating radar from Italian findings. Investigator Roberto Orosei of "MARSIS" Italian experiment at South pole location.
2. [New Ice discovered on Mars](#), radar sounding NASA's reconnaissance orbiter from Utopia, Planica 200 mile wide basin in an ancient impact crater with ice sheet of more water than that of Lake Superior and spans an area larger than New Mexico. Ranges in thickness of 260 to 560 ft and believed to be accumulated snowfall, frozen during an ice age. Frozen over and covered later with soil. Researcher thinks it is 50% pure and is made up of frozen water, dirt, rocks and porous spaces mixed in.
3. [Massive deposits of ice found](#) in 8 locations unidentified by the Mars Reconnaissance Orbiter under the surface of Mars. Water found under 1-2 meters of rock and soil. Suitable for mining,

Mole Drilling Types:

1. Horizontal [Bullet "Mole"](#) using pipe with threaded cap on it.
 - a) Manually hammering pipe up to 21'-0" horizontal.
 - b) Connect flexible rolled pipe to adapter to ridged pipe and pull back through
2. [Horizontal "Missile"](#) drilling under driveway flexible using hose 8" deep below driveway.
 - a) Requires 1 person to operate
 - b) Removes by backing up in reverse
 - c) Requires air compressor
 - d) Goes in a straight plane horizontally vibrating along the way moving forward away from compressor

- e) Need sufficient area at where piercing in soil is for flexible hose at end of drill to go in hole
3. [“Hammer Head Mole”](#) drilling (requires air compressor operating at 100-150 psi)
 - a) Requires 2 people to operate
 - b) Connect piercing tool and tool air supply hose.
 - c) Determine the length of the bore.
 - d) Starting at tool, mark bore length on the tool supply hose with electrical tape.
 - e) To aid in monitoring tool progress mark hose every 5ft to 10ft intervals.
 - f) Tool size from 2: to 5”
 - g) Dig pit at launch point below grade at elevation of bore.
 - h) Mount launch cradle anchored to ground
 - i) Mount piercing tool to launch cradle
 - j) Remove by removing head and pulling hose after tapping head shut
 4. [American Directional Drill](#) VR-500
 - a) Typical Oil & Gas drilling rig
 - b) Speed, safety & performance
 - c) Horizontal drilling available
 - d) All equipment on 1 trailer pulled big rig
 - e) Rig loaded with drill pipe rack& pinion thrust
 - f) 77’—0” Mast
 - g) No derrick or floor hands
 - h) 2 – 700hp diesel combustion engines

[Water Well Design Diagram](#) outlining what to do and how to do it.

You Tube Video on Drilling on Mars:

1. [NASA Insight lander drill is stuck for 6 months on Mars](#)
2. [NASA's Mars Insight 'Mole' is Stuck - Fixes Proposed](#)
3. [MARS DRILL WATER: Curiosity Rover Hits Water: NASA Stays Silent](#)
4. “Mole” drilling technique.
5. [How one Italian scientist spent 10 years establishing an oasis on Mars](#)
6. [Liquid water under Mar’s southern cap, by Robert Orosei](#)
7. [Google “Robert Orosei”](#)
8. [Radar Soundings of Subsurface of Mars](#)
9. [Curiosity rover finds evidence for ancient ice covered lake on Mars](#)

Mars Deep Driller. The Mars Exploration Rovers have revealed clear evidence for near-surface (several to tens of meters) stratigraphy on Mars, which contains fundamental information about the history of Mars and the history of water within those regions of Mars that were once wet. Drilling can potentially reach depths of up to 1 km, sampling layers that are largely unmodified by near-surface chemical processes, and may reach layers that are not exposed for view anywhere on the surface. The speed and depth of drilling need to be matched to available power sources. Slow, shallow drilling may be within the capabilities of an RPS, but deeper, faster drilling may require power from a small nuclear reactor. An RPS-powered mission of this type has been studied for launch sometime in the next decade.

Creating Drinking Water and Hydrogen for Rocket Fuel

The diagram is of a water well system similar to the one drilled on Earth. The difference is the well is drilling thru ore/ice and a heated zone will be created by a heating element lowered with the water pump. After the heating element warms up the ground and releases the water above freezing. The pump senses this and turns itself on and pumps the liquid water out of the ground into a heated storage tank. The piping is heated with electrical heat tracing along the piping to a heated storage tank. Some of the water is filtered or processed into drinking water. The balance is used to create rocket propellant by piping it to the propellant processing plant where the H₂O is split into hydrogen and oxygen. Both the oxygen and hydrogen are pumped into pressurized tanks for storage. The Hydrogen is mixed in a process with Carbon Dioxide to create rocket fuel or propellant (CH₄).

Water Well Drilling Operation Design

